TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN MEDICAL ENGINEERING

SECOND YEAR SEMESTER ONE

EEE 4232: CIRCUIT AND NETWORK ANALYSIS

SPECIAL SUPPLEMENTARY EXAMINATION

SERIES: SEPT. 2017

TIME:2HOURS

DATE: SEPT. 2017

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt any three questions, all questions carry equal marks.

Do not write on the question paper.

Question ONE

a) i) State superposition theorem.

ii) In the network of Fig 1(a), use superposition theorem to determine the:

I. Potential difference across 18Ω resistor.
II. Current in the 8V battery.
III. Current in the 3V battery (11mks)

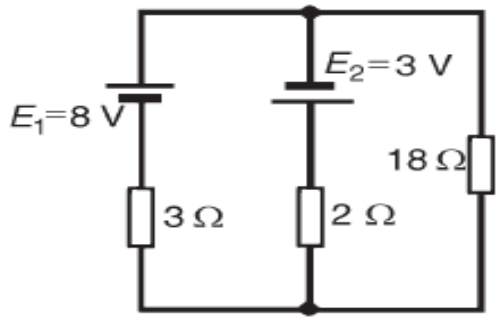

Fig 1(a).

b) Use the mesh analysis theorem in Fig 1(b) to determine:

(i) The voltage drop across 5Ω resistor

(ii) The current flowing along 8Ω resistor (9mks)

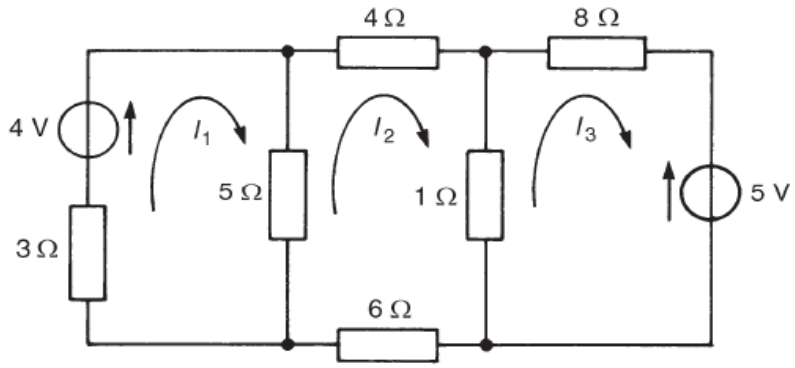

Fig 1(b)

Question TWO

.a) An alternating voltage is given by the expression V = 75sin (200πt – 0.25) volts. Determine Its:

(i) Amplitude
(ii) Peak to peak value
(iii) Rms value
(iv) Periodic time
(v) Frequency
(vi) Phase angle (12mks)

b) A coil of resistance 5Ω and inductance 120mH in series with a 100μF capacitor is connected to a 300V, 50HZ supply. Determine the:

(i) Supply current

(ii) Phase difference between the supply voltage and the current
(iii) Voltage across the coil
(iv) Voltage across the capacitor (8mks)

Question THREE

a) State the kirchoff's current law. (2mks)
b) In the network of Fig 3(b), use Nodal analysis theorem to determine:
   (i) The voltage at nodes 1 and 2
   (ii) The current flowing along j4Ω inductor
   (iii) The current flowing along the 5Ω resistor
   (iv) The magnitude of the active power dissipated along 2.5Ω resistor (12mks)

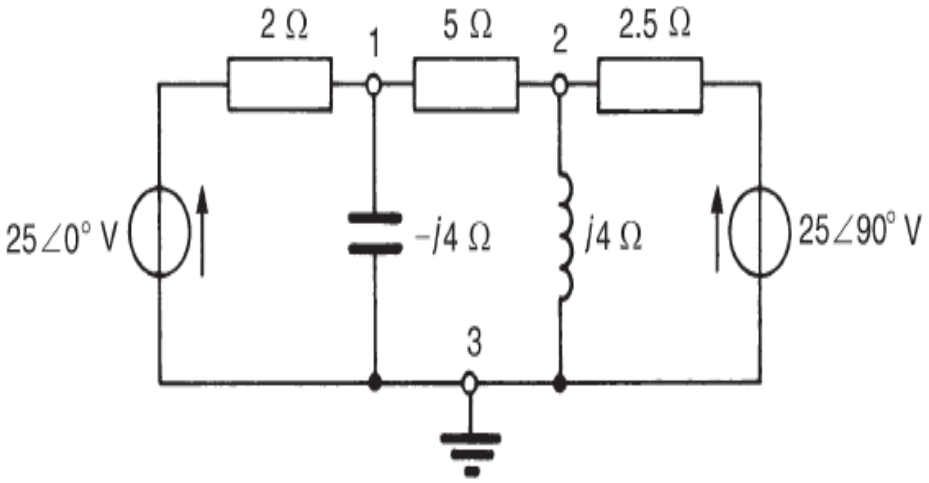

Fig 3(b)

c) Determine the value of load resistor R_l shown in Fig 3(c) that gives maximum power dissipation hence determine the value of the power. (6mks)

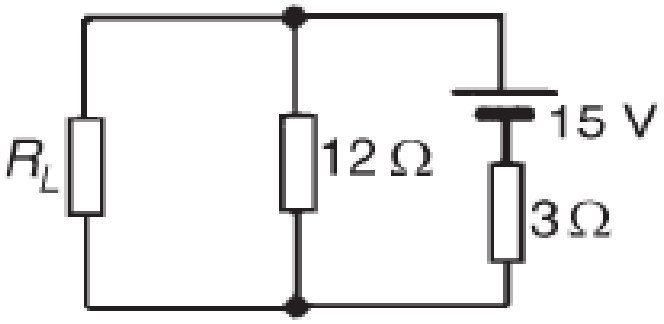

Fig 3(c)

Question FOUR

a) Define the following terms as used in filter network
   (i) Filter
   (ii) Characteristic impedance (2mks)

b) With aid of a low pass T-section network, show that;

$$Z_{0T} = \sqrt{\frac{L}{C} - \frac{\omega^2 L^2}{4}}$$ (10mks)

c) Calculate the characteristic impedance and cut-off frequency of T-section low pass filter having series arms of 30mH and a shunt arm of 0.176μF hence draw the network.

(8mks)

Question FIVE

a) Using Delta- star transformation in Fig 5(a), determine the:
   (i) Equivalent circuit impedance across terminals A and B
   (ii) Supply current I
   (iii) Power dissipated in the 10Ω resistor (12mks)

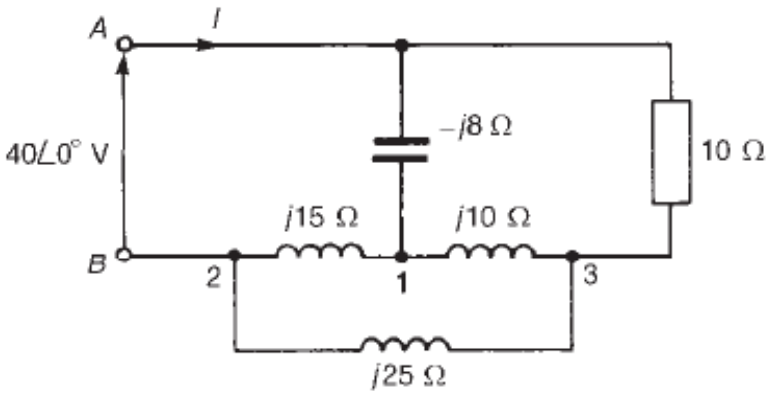

Fig 5(a)

b) Design a T-section band stop filter network to stop all frequencies between 400HZ and 1KHZ. The load impedance is 600Ω. Draw the network. (8mks)